

Contractors Training for Underground Stormwater Facility Maintenance

April 9, 2010

Presented by Francis Flabbi

Purpose of Training



- Review requirements for working in Montgomery County.
- Review DEP maintenance policy and procedures.
- Information on who to contact.
- Proper maintenance procedures for underground stormwater facilities.

Contractor Requirements for Waste Disposal

- Notify the Oaks Landfill Facility 48 hours in advance of dumping (Phone No. 301-977-6798).
- Notify the Oaks Landfill Facility again one hour before entering scales.
- Provide a trip ticket from the Transfer Station Scale House to the Oaks Landfill Facility Operator.
- Maintenance Contractor has one (1) hour to arrive at Oaks Landfill.
- Upon arrival at the Oaks Landfill, maintenance contractor provides copy of trip tickets from Transfer Station Scale House to Oaks Landfill Facility Operator.
- Maintenance Contractor shall ensure no hazardous, medical, sewer or radioactive waste are disposed at the Oaks facility.
- Maintenance Contractor shall ensure all loads to be dumped at the Oaks facility originate in Montgomery County.
- Maintenance Contractor shall ensure copy of DEP Policies and Division of Solid Waste Services Operating Procedures are the Maintenance Contractor's truck at all times.

Shady Grove Transfer Station

16101 Frederick Road

(Enter off Shady Grove Road)

Derwood, MD. 20855

240-777-6560

North

Shady Grove Road

Scale House

Frederick Rd.
(MD. Rte. 355)



MONTGOMERY COUNTY OAKS LANDFILL



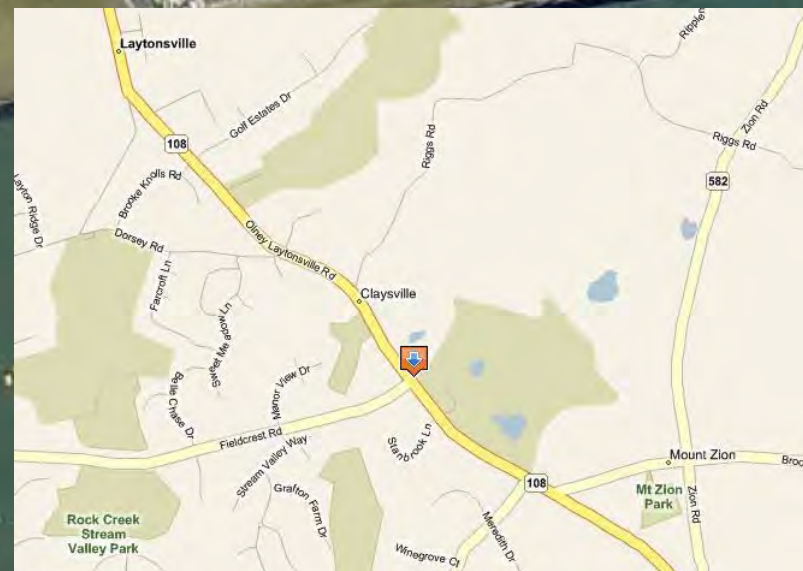
LEACHATE PRETREATMENT FACILITY

DECEMBER, 1994

Dump Pit

Mulch Stockpiles

Building Containing Anaerobic
Decomposition Facility



6001 Olney-Laytonsville Road
(near Fieldcrest Road and MD. Rte. 108)
Laytonsville, MD.

Maintenance Procedures

1. Our office sends Maintenance Notification (letter/e-mail) to property owner notifying them of maintenance requirements.
2. Owner has 45 days to complete maintenance.
3. Contractor notifies MC.DEP (SWInspections@montgomerycountymd.gov), **48 hours prior to cleaning** to schedule the inspection.
4. Contractor *Does Not* **notify inspection contractor.**
5. Contractor notifies the Oaks Facility prior to arrival and delivery of waste materials.
6. Contractor contacts MC.DEP Inspector (Francis Flabbi/Brian Gregg) each day at site.
7. MC.DEP Inspector inspects cleaning and issues finalized notification to owner.

Private Maintenance Contracts

Before executing an annual maintenance contract with a property owner, please contact our office to determine the annual, scheduled maintenance date for the facility.

Failure to coordinate your maintenance with our schedule may result in our inability to inspect the completed work. In such instances, we will require the property owner to clean their structure(s) in accordance with our schedule, regardless if the structure has been cleaned within the previous year.

We have a schedule of over 100 private and public facilities to clean and inspect each month. Our inspection schedule has very little flexibility. We do not have the staff or time to accommodate unscheduled inspection requests for maintenance operations that conflict with our schedule.

We will make every effort to work with you, but it is a “two-way” street.

Maintenance Notification and Inspection Report

- **Stormwater Asset/Facility Number(s)*:**
MC.DEP Inspection Staff will not be able to assist you without this number.
- **Stormwater Facility Type(s):** This will tell you what types and how many facilities are at this location.

* This number may be a “Sequence Number” or an “Asset Number”.

Maintenance Notification Letters

Facility Information at Top of Letter



DEPARTMENT OF ENVIRONMENTAL PROTECTION

Isiah Leggett
County Executive

September 30, 2006

Robert Hoyt
Director

Annual Cleaning & Inspection Letter

Exxon Mobil Headquarters
Joseph V. Mossary, Regional Engineering and M&R Coordinator
P.O. Box 5639
Fairmount, VA 22403

Work Order No: 14868
Property Owner: Exxon Mobil Corp
Structure Type: SEP (Oil/gnt separator)
Asset No: 11806

Property Name: Exxon
Property Address: 15211 Frederick Rd
SW Facility No: 1908.02

Dear Sir or Madam:

This letter is to notify you that your underground stormwater facility will soon be due for an annual maintenance inspection. Owners of underground stormwater facilities are required under Section 19-28 of the Montgomery County Code to perform whatever maintenance is necessary to ensure that the facility remains in proper working condition. In order for you to comply with these requirements, the Department of Environmental Protection (DEP) advises that you pump-out, clean and dispose of all solid waste (sediments, sludge and floatable debris, etc.), and power wash the facility annually.

Please use the following steps to ensure your underground stormwater facility remains in proper working condition:

1. Obtain a contract with a maintenance contractor to perform the annual maintenance. Enclosed is a list of qualified contractors who have met the regulatory requirements. Please be advised that DEP cannot endorse or recommend a contractor.
2. Once the contract is executed, fax the contract to DEP Inspector Mike McElroy, at (240) 777-7752.
3. Notify Mr. McElroy at least 48 hours before beginning the maintenance work on your stormwater facility so that a DEP inspector can be present on-site while the work is being performed. Mr. McElroy may be contacted by e-mail at DEP_SWinspections@montgomerycountymd.gov.

DEP will make every effort to cooperate with owners of underground stormwater management facilities. However, it is the responsibility of the owner to ensure the completion of maintenance of all stormwater facilities on their property within 45 days. If upon inspection, DEP finds that the facility has not been maintained as required by law, the owner may be subject to an enforcement action resulting in fines and penalties.

Each owner is responsible for ensuring the on-time completion of all required maintenance of a stormwater facility and that persons entering "confined spaces," as defined at Md. Code Ann., Lab. & Empl. § 5-802 (a) (2), comply with applicable occupational safety and health regulations. For your convenience, we have attached a Designation Of Authorized On-Site Representative form. The purpose of this form is to allow us to interact directly with those individuals who manage or maintain your property. Our experience has shown that our direct interaction with those who manage or maintain your property improves communications and thereby ensures maintenance operations are performed in an efficient and cost effective manner. If you have questions, please feel free to contact me at (240) 777-7760 or Mike McElroy at (240) 777-7744.

Sincerely,

Jerry Oden
Field Supervisor
Stormwater Mgmt. Inspection Program

Watershed Management Division

285 Knottel & Pike, Suite 20 • Rockville, Maryland 20850 • 240-777-7700
www.montgomerycountymd.gov



DEPARTMENT OF ENVIRONMENTAL PROTECTION

Isiah Leggett
County Executive

September 3, 2008

Robert Hoyt
Director

Triennial Inspection Letter

Dept. of Facilities Management, Division of Maintenance
Mike Allnut, Assistant Director of Division of Maintenance
18651 Crabbs Branch Way
Rockville, MD 20855

Work Order No: 21397
Property Owner: MCPS
Structure Type: SEP (Oil/gnt separator)
Asset No: 11560

Property Name: Montgomery Blair High School
Property Address: 51 University Blvd. East
SW Facility No: 3390.04

Dear Sir or Madam:

This letter is to notify you that your underground storm water facility will soon be due for a triennial inspection and annual maintenance. Owners of underground storm water facilities are required under Section 19-28 of the Montgomery County Code to perform whatever maintenance is necessary to ensure that the facility remains in proper working condition. In order for you to comply with these requirements, the Department of Environmental Protection (DEP) advises that you pump-out, clean and dispose of all solid waste (sediments, sludge and floatable debris, etc.), and power wash the facility annually.

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Jerry Oden
Field Supervisor
Stormwater Mgmt. Inspection Program

Watershed Management Division

285 Knottel & Pike, Suite 20 • Rockville, Maryland 20850 • 240-777-7700 • 240-777-7715 FAX
www.montgomerycountymd.gov

Hard Copy
Notification
Letters

Inspection Report



DEPARTMENT OF ENVIRONMENTAL PROTECTION

Isiah Leggett
County Executive

March 27, 2009

Inspection Repair Report


Hard Copy
of Repair
Report

Property Owner : George Meany Center for Labor
Studies
Asset No. : 11434
Property Address : 10,000 New Hampshire Ave
Structure Type : PDWT(Pond-wet, quality and quantity control)
Property Name : George Meany Center for Labor
SW Facility No. : 1042.02

	Description	Comments
10	F-INSP Final Inspection required by DEP once repairs completed	
20	S-PS02 Repair corrosion, re-coat or re-paint components of principle spillway	
40	SD-OF03 Repair damaged or deteriorated storm drain pipes	Repair separation and exposed metal in infall pipe.
50	SD-OF03 Repair damaged or deteriorated storm drain pipes	Parge second infall barrel and repair joint separation.
60	S-DP04 Remove accumulated sediment & debris from dry pool	
70	S-RO02 Other Structural Repair (see comments)	Parge concret inlet in pilot channel

Belowground Maintenance Notification Procedures

Infor EAM

 **Print Short WO Cards**

Version 8.2
Date 03/23/2010 17:42
User ODENJ
Organization DEP [Department of Environmental Protection]
Work Order 23310 [BR Repairs: Calverton-Galway Local Park (seq#202207.02)]
Print Attachments No
Print MEC Attachments No
Search MEC Work Orders No

Work Order No.

03/23/2010 17:42 Montgomery County Government - Maryland Page 1

**Equipment
Or
Asset
Number
vs.
Sequence
Number**

Infor EAM **Work Order No.**
Print Short WO Cards

Work Order 23310 (DEP) BR Repairs: Calverton-Galway Local Park (seq#202207.02) Scheduled Start 08/11/2009
Status Released/Open Date
Parent Work Order
Department SWM-MNCPPC-DEP Parks Maintained by DEP WO Type REP
Class AGNS
Priority
Warranty N
Safety N
Equip Criticality
Assigned To EDMISC
Assigned By

Standard WO REPWOAGBR BR Repairs:
Equipment 13020 (DEP) Calverton-Galway Local Park
Location INSP-REG01 (DEP) Inspection Region 1
Equipment:
Manufacturer
Equipment Model
Equipment Serial
Number
Date Started
Estimated Hours 2
Estimated Cost 0.00
Actual Cost 0.00
Date Completed 02/29/2008

Equipment Custom Fields

Sequence Number 202207.02
Sediment Control Permit # 97A210001
Access Street Fairland Rd
Stormwater File Number NS96007
Owner MNCPPC
Property Management Co. Park Development Division

Work Order Custom Fields

Letter Type AGNSLTR-120
Date Letter Sent 06/02/2008

Activity	Trade	Est. Hours	People Req.	Task	Description
10	INSP	1	1	F-INSP	Final Inspection required by DEP once repairs completed A Final Inspection must be performed by DEP once repairs are completed. Contact your DEP Inspector to schedule the Final Inspection.
20	CMAINT	1	1	N-ACS01	Remove woody growth & undesirable vegetation within 10' of accessory structures

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REPAIR WORK ORDER

**Electronic Repair Report (e-mail attachment)
from MC.Stormwater@montgomerycountymd.gov**

Maintenance Notification and Inspection Report

- **Annual Maintenance:** Use the cleaning methods and procedures that are contained in this training or use method(s) listed.
- **Repairs Required:** If repairs are necessary, these repairs will be in the ***Inspection Repair Report or Work Order*** attached to the Maintenance Notification Letter or e-mail. These repairs must be completed at the time of cleaning.
- All repairs must be included your Bid.

Scheduling an Inspection

- Call the MC.DEP Inspector at least **48 hours** prior to cleaning and performing repairs
- E-mail a notice of cleaning and repairs to DEP:
SWInspections@montgomerycountymd.gov

Day of Cleaning

- Contact MC.DEP Inspector (Francis Flabbi/Brian Gregg) on the morning of maintenance
 - Francis Flabbi: 240-777-7755
 - Brian Gregg: 240-777-7747
 - Email: SWInspections@montgomerycountymd.gov

On Site



- All contractors must call the MC.DEP Inspector each day that maintenance is proceeding.



- Call the MC.DEP Inspector if you cannot keep the appointment.



- Contact Oaks Treatment Facility with time of delivery

- ❖ Contact: Mr. Hugo Martin

- Phone: 301-977-6798



- Owners will not receive credit unless all procedures outlined in the presentation are followed

Problems?

- Call the MC.DEP Inspector.
 1. Call Francis Flabbi, 240-777-7755
 2. Call Brian Gregg, 240-777-7747

- If Francis or Brian is unavailable then:
 1. Call Ed Edmiston, 240-777-7721
 2. Call Steve Pullum, 240-777-7780



What happens if you fail to comply with the maintenance procedures??

DEP may issue a civil citation to the owner or management company if :

- Inspector is not notified **48 hours** before maintenance is to begin, and
- Inspector is not notified **each morning** maintenance is to begin.
(COMCOR Chapter 19, Section 19-28)



Now you Know

- Obtain an Oil Operations Permit from the Maryland Department of the Environment
 - <http://www.mde.state.md.us>
- Maintain Confined Space Certification
 - <http://www.osha.gov>
- Follow Montgomery County Noise Control Ordinance
 - Call 240-777-7700 for permit information
 - Call be will answered by Montgomery County Call Center, not by MC.DEP Staff.*
- Follow Montgomery County Work Zone Traffic Control and/or Maryland State Highway Administration Traffic Control Standards
 - Call 240-777-2190 for permit information

Maintenance Procedures

Non-Proprietary:

- Oil/Grit Separator
- Structural Sand Filter
- Underground Detention
Pipe System
- Other

Proprietary:

- AquaFilterTM
- Aqua-SwirlTM
- BaySaverTM
- Stormceptor[®]
- StormFilter[®]
- Vortechs[®]

Initial Maintenance Procedures

All Structures

1. Install an outfall pipe plug to ensure no water bypasses the system



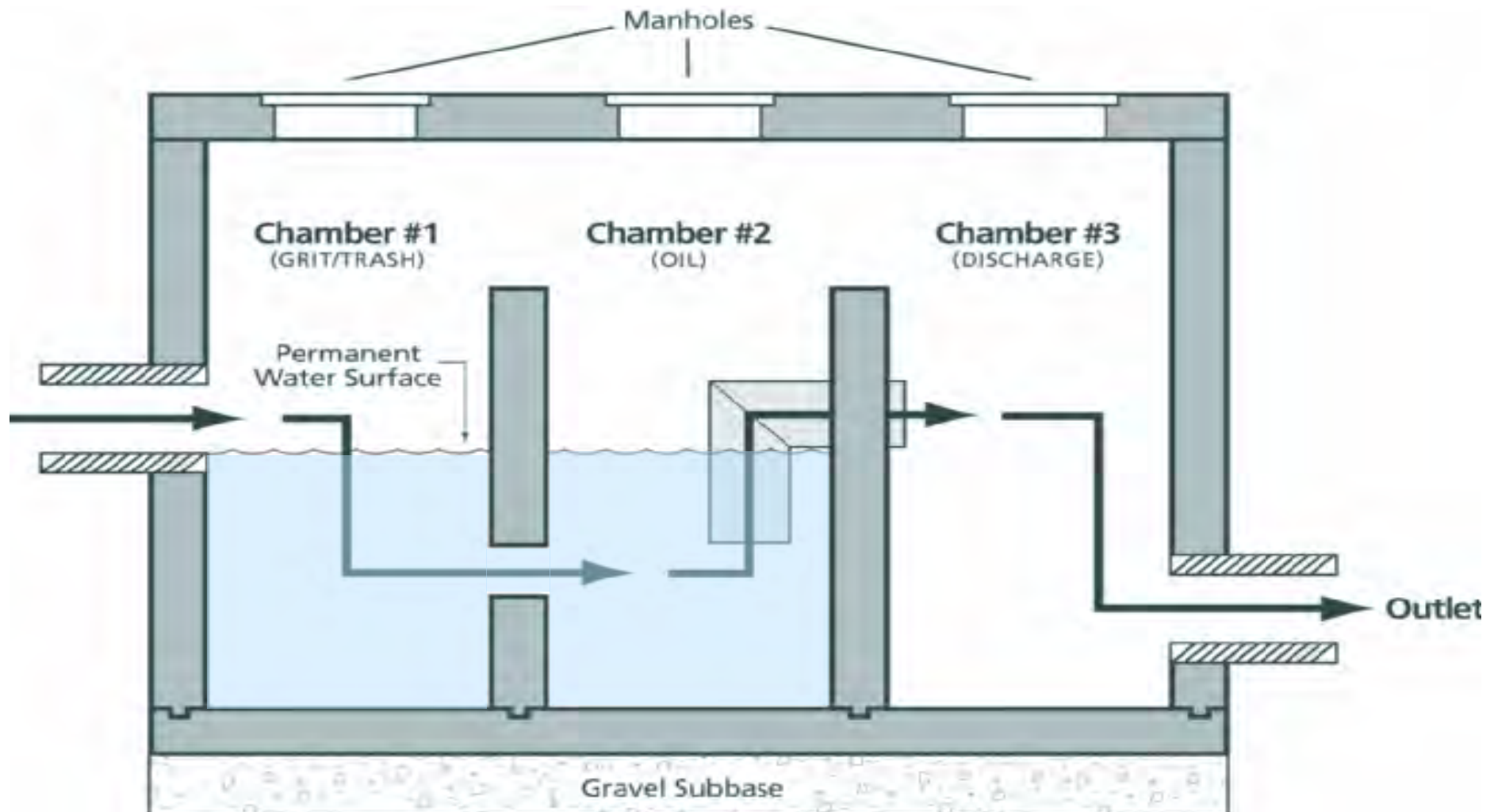
Initial Maintenance Procedures

All Structures

2. Hydrojet the inlet pipe from the 1st inlet structure that flow into the Stormwater Management Structure. **For Example:**



Oil/Grit Separators





Oil/Grit Separator



Oil/Grit Separator

Oil/Grit Separator Maintenance Procedures

1. Install an outfall pipe plug to ensure no water bypasses the oil/grit separator system
2. Hydrojet the inlet pipe from the 1st inlet structure that flows into the oil/grit separator
3. Vacuum water, sediment, and debris from all chambers.
4. Powerwash the inlet throat to the oil/grit separator,
5. Powerwash all walls, floors, and weirs.
6. Clean trash and debris from outside surface of the trash rack.
7. Powerwash the 90 degree elbow.
8. Clean the outfall pipe.



**Oil/Grit Separator
Chamber #1**



**Oil/Grit Separator
Chamber #2**

Oil/Grit Separator

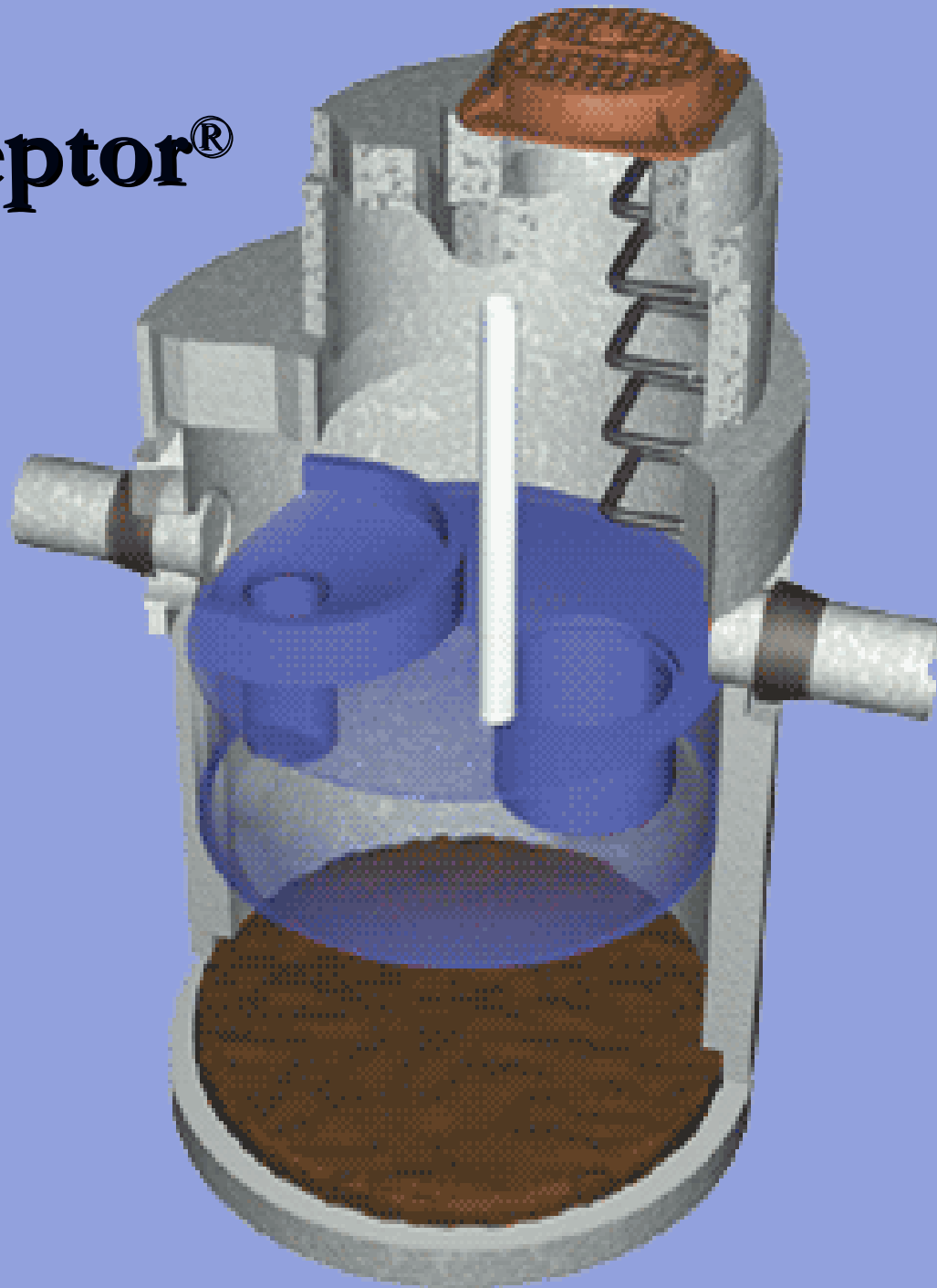


Pressure Washing Interior of All Structures Required

Even after vacuuming out all liquids and trash. Substantial oily deposits remain on the structure walls and components



Stormceptor®



Stormceptor® Maintenance Procedures

1. Install an outfall pipe plug to ensure no water bypasses the Stormceptor system
2. Hydrojet the inlet pipe from the 1st inlet structure that flows into the Stormceptor system
3. Powerwash the ceiling, walls, and floor of the lower chamber
4. Remove the inspection port plugs
5. Clean the drop T-pipe
6. Clean and remove sediment from the bypass chamber
7. Clean the outfall pipe to the 1st joint
8. Reinstall the inspection port plugs

Stormceptor®

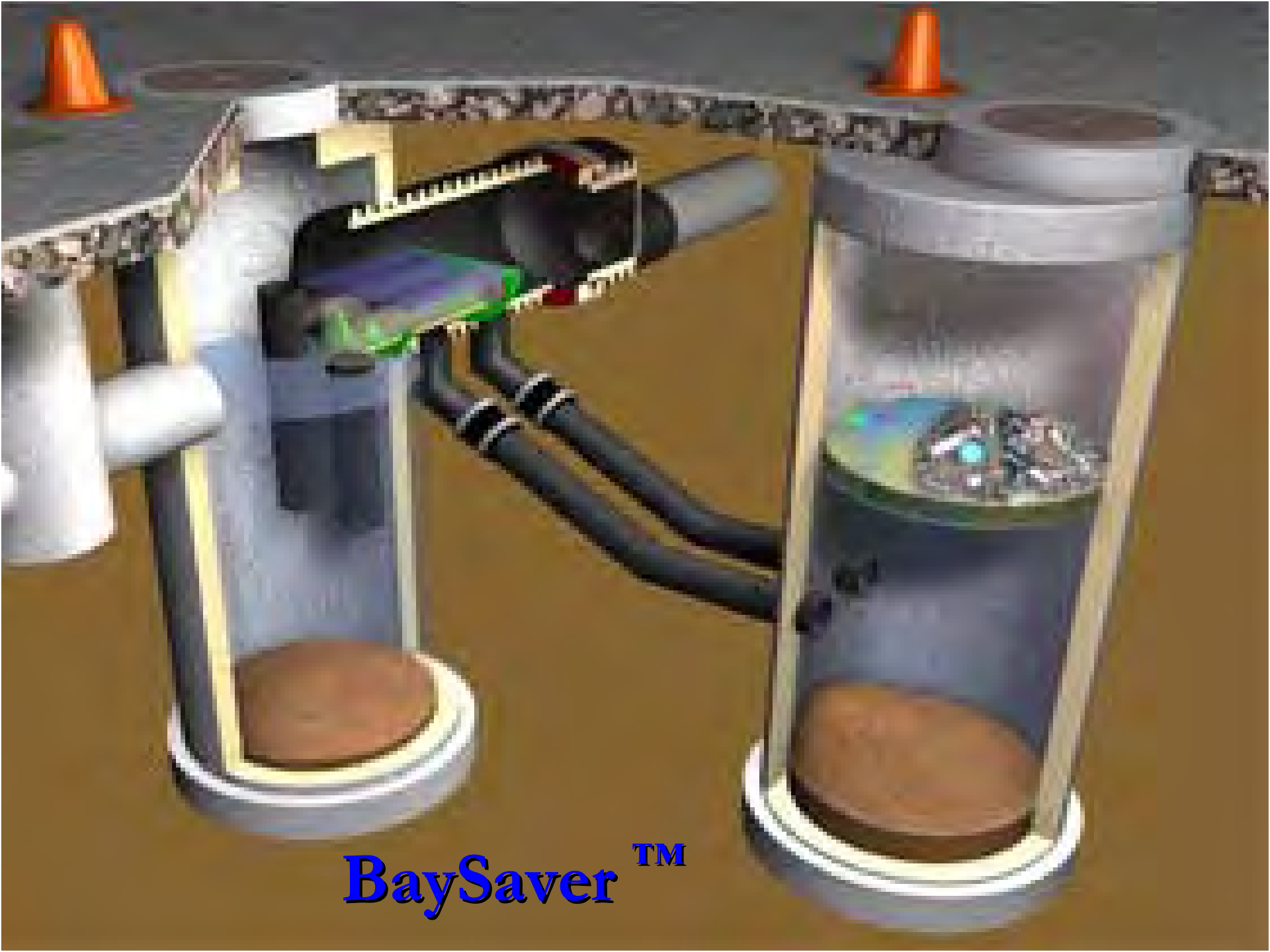


Stormceptor®



Stormceptor®





BaySaver™

BaySaverTM Maintenance Procedures

1. Install an outfall pipe plug to ensure no water bypasses the BaySaver system
2. Hydrojet the inlet pipe from the 1st inlet structure that flows into the BaySaver systems
3. Vacuum water and sediment from chambers A and B
4. Hydrojet both connector pipes between chambers A and B
5. Powerwash floors and walls of chambers A and B
6. Clean trash, debris, and sediment from the weir chamber
7. Clean the outfall pipe

BaySaver™



BaySaver™



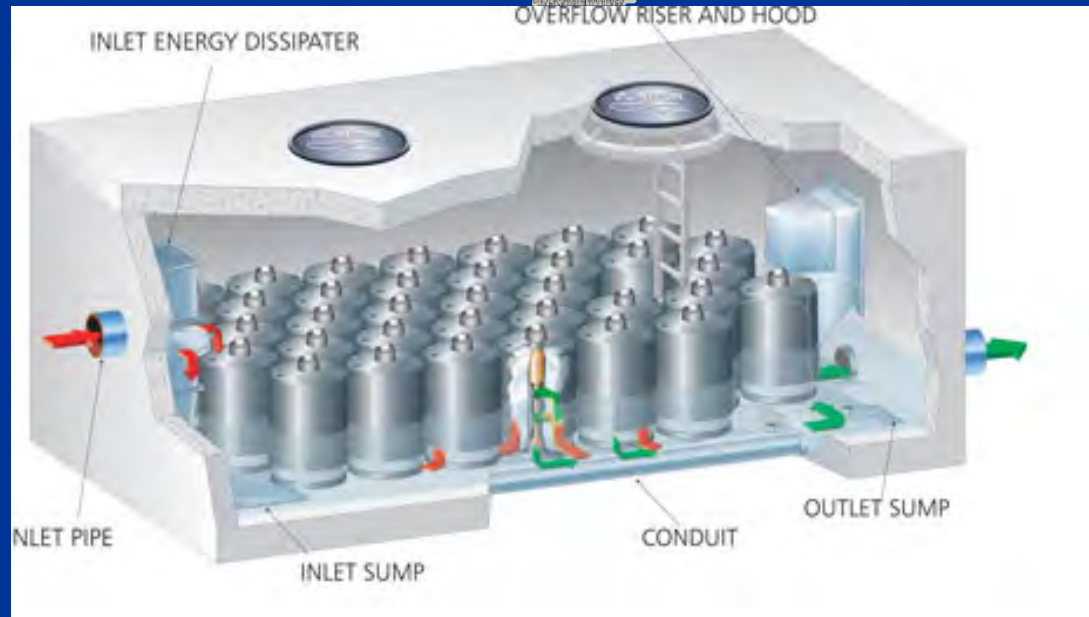
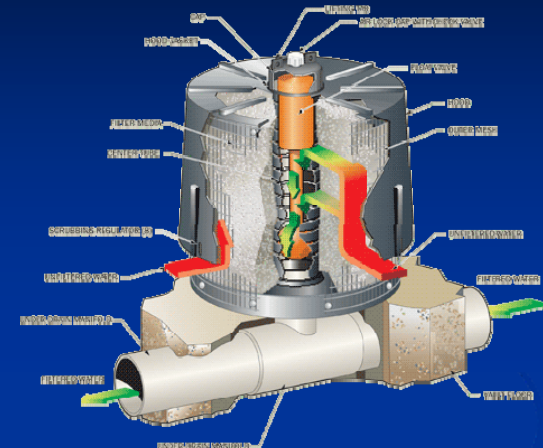
BaySaver™



StormFilter[®]

- Types of filter materials
 - Perlite Cartridges
 - XF CSF Cartridges (extra fine-CFS leaf media)
 - Zeo-Perlite
 - SMZ-Perlite

Replacement Cartridges Must Use the XF CSF, Extra Fine Leaf Media Cartridges



StormFilter[®]

- StormFilter[®] is a proprietary storm water quality structure manufactured by Stormwater Management, Inc.
- The Contactor shall be responsible for verifying the type, size, and manufacturer's recommendations for each facility to be maintained or repaired.
- The Contractor will be required to use parts and materials recommended by the Manufacturer, unless a written approval is issued by the DEP inspector.

StormFilter[®]

Maintenance Procedures

- Prior to submitting a proposal for maintenance on a storm filter facility, please contact Francis Flabbi or Brian Gregg so he may make a determination of maintenance requirements.
- Contractor may not start maintenance of a StormFilter until ALL replacement cartridges are on site and the MC.DEP Inspector has granted written approval to start work.
- Care must be used to avoid damaging the cartridges or manifold connectors during the removal and installation. (Cartridges have left hand thread into manifold.)

StormFilter[®]

Maintenance Procedures (cont.)

1. Install an outfall pipe plug to ensure no water bypasses the StormFilter system
2. Hydrojet the inlet pipe from the 1st inlet structure that flows into the StormFilter system.
3. Vacuum and powerwash the forebay or grit Chamber
4. Remove the filter cartridges
5. Remove sediment from the filter bay and power wash the walls and floor

StormFilter[®]

Maintenance Procedures (cont.)

6. Powerwash underdrain pipes
7. Install new filter cartridges
 - Apply a light coating of silicon grease to the outside of the exposed portion of the connectors to ensure watertight connection between the cartridge and the drainage pipe, as needed
 - Replace any damaged connectors, as needed
8. Vacuum and powerwash the outfall bay
9. Hydrojet the outfall



StormFilter[®]

StormFilter[®]



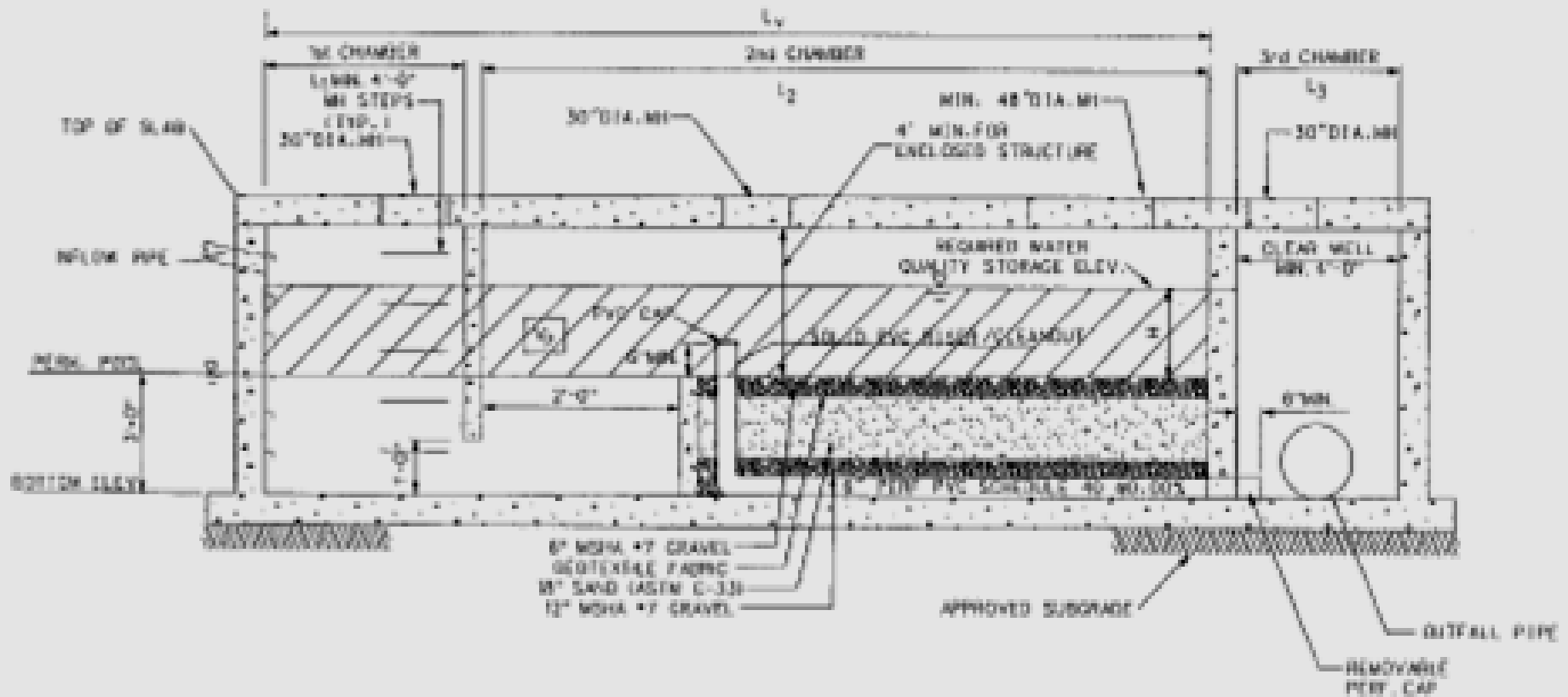
StormFilter®



StormFilter[®]



Separator Sand Filter



Typical Section – Separator Sand Filter

Sand Filter[®]

Maintenance Procedures

- Prior to submitting a proposal for maintenance on a sand filter facility, contact the MC.DEP Inspector so he may make a determination of necessary maintenance requirements and assist with developing the scope of work for your contract.
- ALL repair material must be on job site next to sand filter before replacement work of filter media begins.
- Replacement of filter material may only start with the MC.DEP Inspector's written approval.

Sand Filter[®]

Maintenance Procedures (cont.)

1. Install an outfall pipe plug to ensure no water bypasses the Sand Filter system
2. Hydrojet the inlet pipe from the 1st inlet structure that flows into the sand filter system
3. Hydrojet the infeed pipe from sand filter inlet to grit bay of sand filter system
4. Vacuum water, sediment, trash, and debris from grit bay of sand filter
5. Clean top surface of sand filter media
6. Hydrojet all under drain pipes and remove debris
7. Vacuum and power wash outfall bay

Sand Filter[®]

Maintenance Procedures (cont.)

■ Gravel Layer Replacement

- The washed gravel layer at the top of the sand filter/sand media must be 6 inches thick and meet MSHA size #7 stone.

■ Geotextile Fabric Replacement

- The geo-textile fabric beneath the 6 inch layer of gravel *and* on top of sand filter shall be Enkamat 7020, or approved equal.
- The fabric rolls must be cut with sufficient dimensions to cover the entire surface of the filter with at least 6-inch overlap.

Sand Filter Maintenance Procedures (cont.)

■ Sand Filter Layer Replacement

- The sand material must meet requirements of ASTM C33 for fine aggregate concrete sand.
- The sand must be placed in uniform depth of 18 inches, *manufactured sand or stone dust is not acceptable.*

■ Replacement of Gravel Bed around Under-drain Pipe(s)

- The washed gravel layer surrounding the under-drain pipe(s) must meet MSHA size #7 stone, and be at a uniform depth of 12 inches.

Sand Filter

Maintenance Procedures (cont.)

■ Under-drain Pipes Replacement

- Under-drain pipe shall be 6 inch diameter, schedule 40 or stronger perforated PVC pipes at 0% slope
- Perforations must be 3/8 inch in diameter spaced at 4 inch on center, every 90 degrees around the pipe
- Cleanouts for each pipe shall extend at least 6 inches above the top of gravel and have a removable waterproof cap

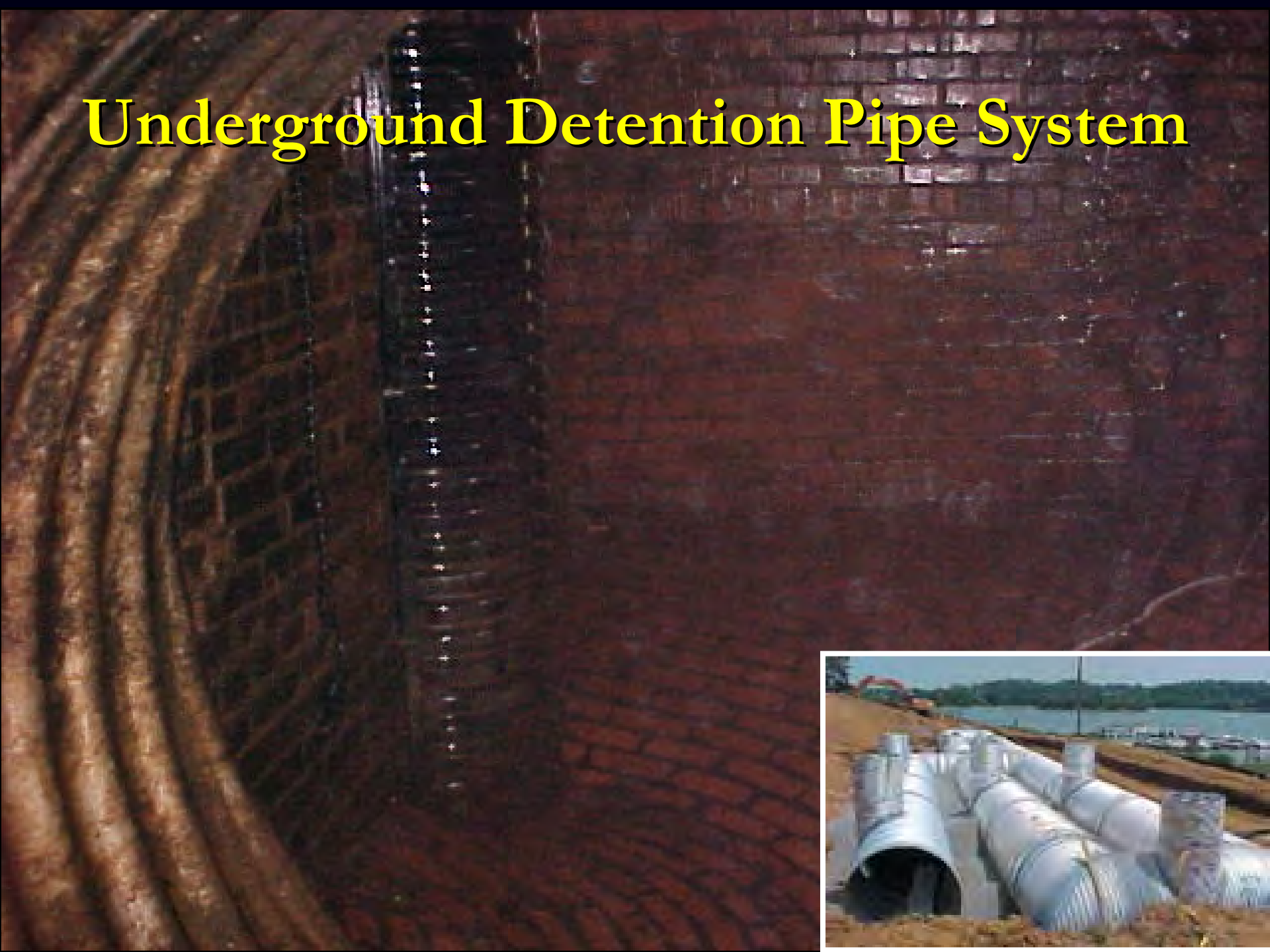
Sand Filter



Sand Filter



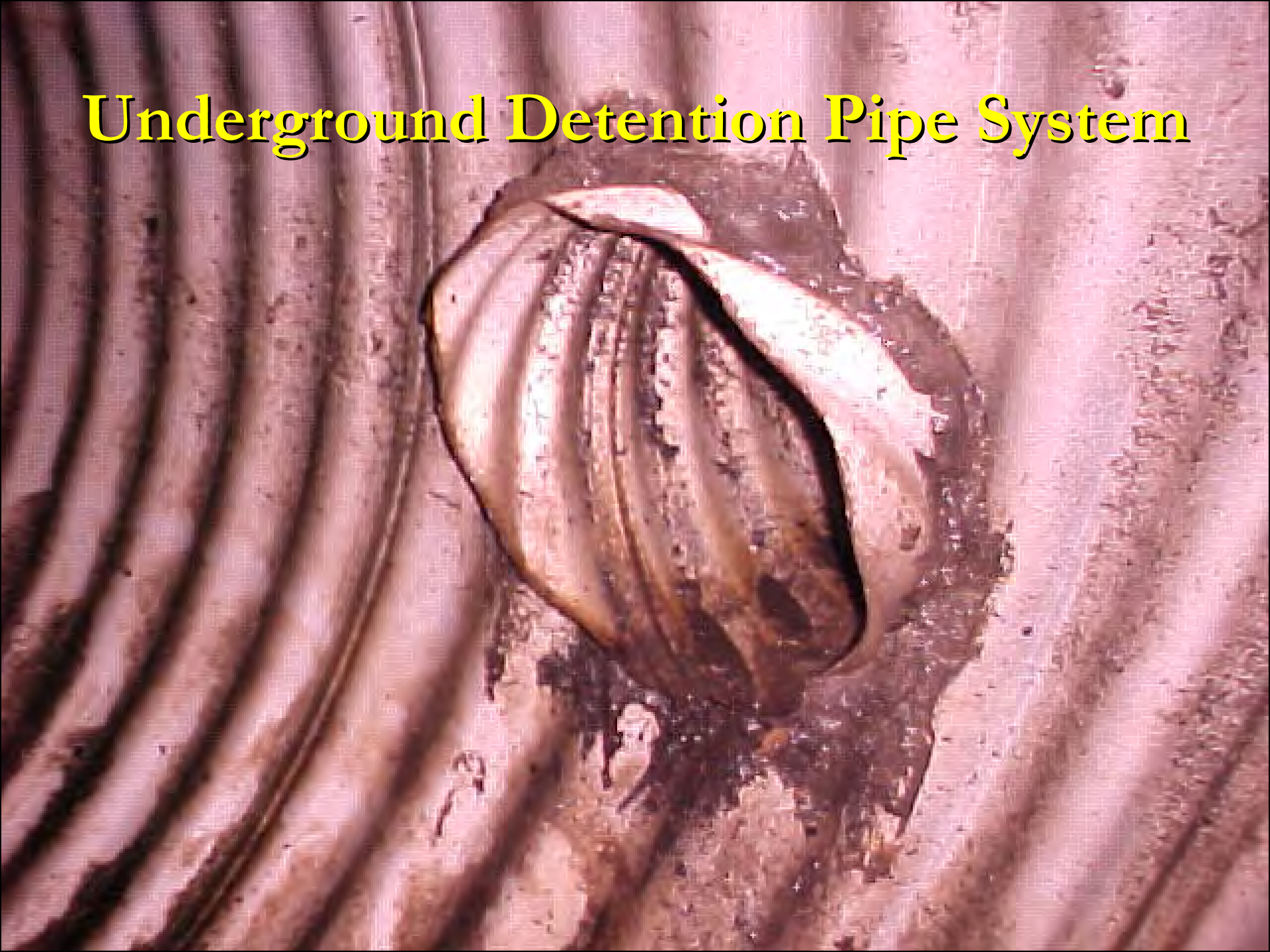
Underground Detention Pipe System



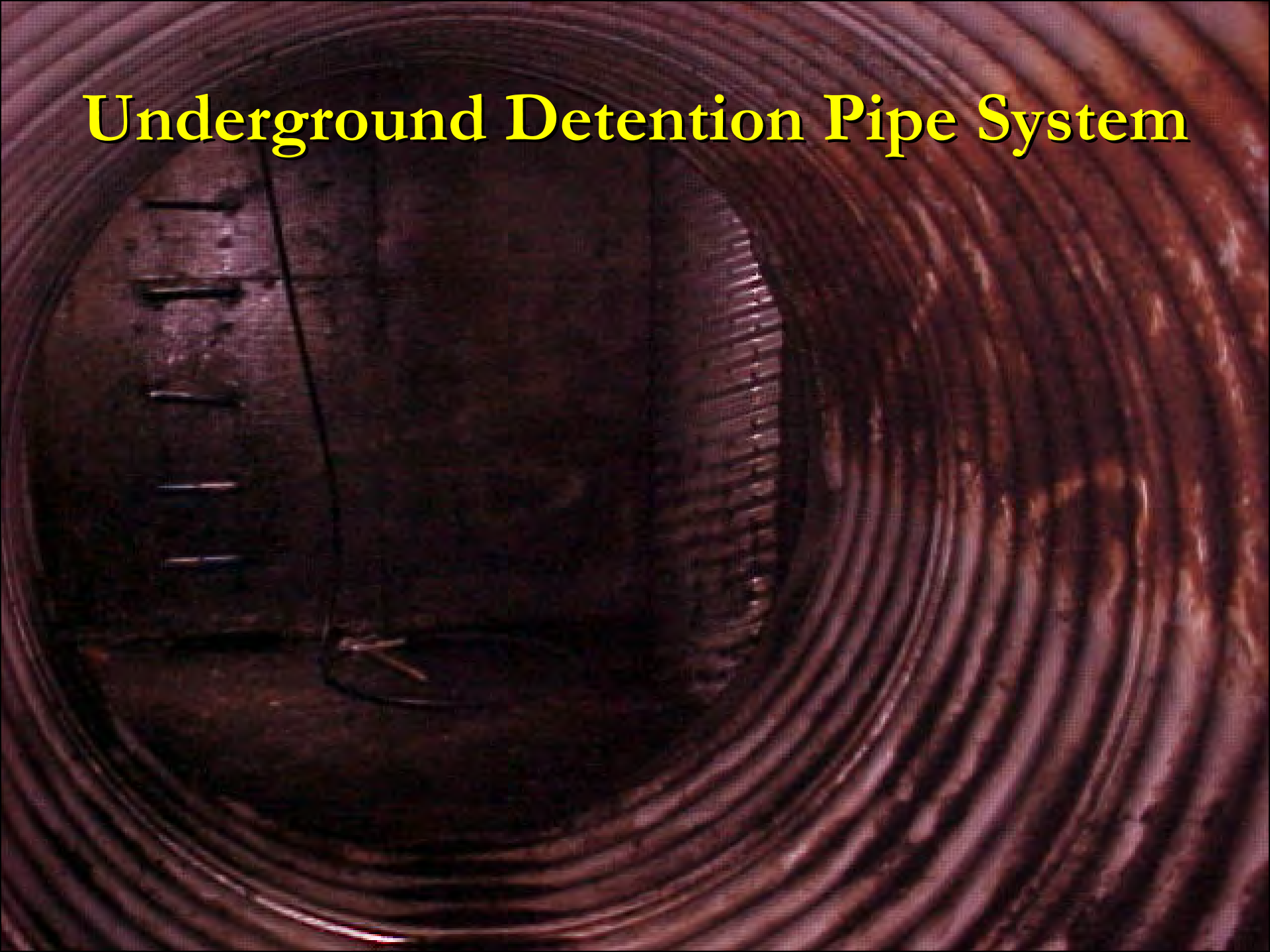
Underground Detention Pipe System Maintenance Procedures

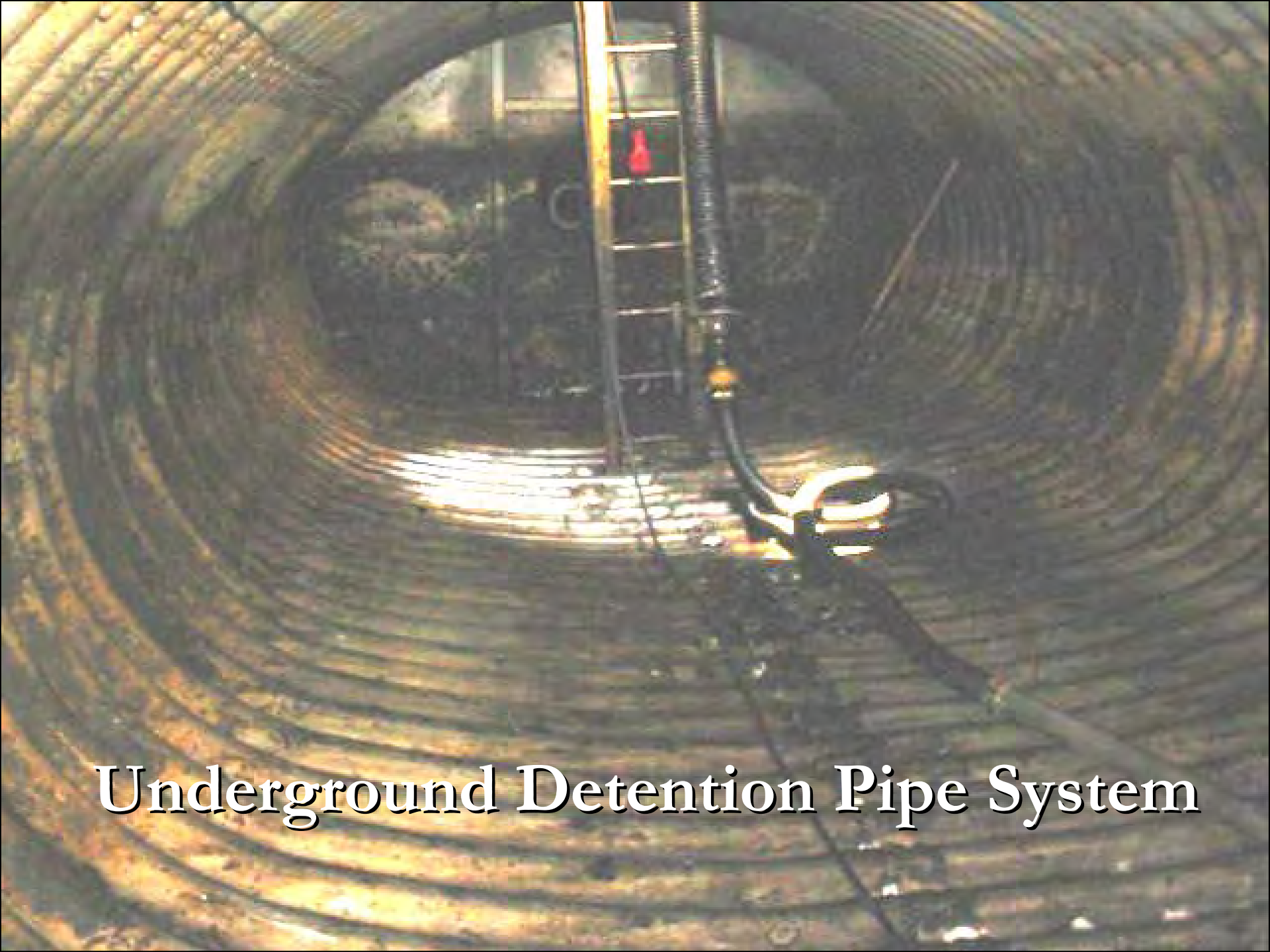
1. Install an outfall pipe plug to ensure no water bypasses the underground detention system
2. Hydrojet the inlet pipe from the 1st inlet structure that flows into the underground detention system
3. Remove all sediment, debris, trash, and water from the underground detention pipes and rack side of the control structure
5. Power wash the entire circumference of the underground detention pipes
6. Power wash the control surface
7. Remove sediment, debris, and trash from the outfall side of the control structure
8. Hydrojet the outfall pipe

Underground Detention Pipe System



Underground Detention Pipe System





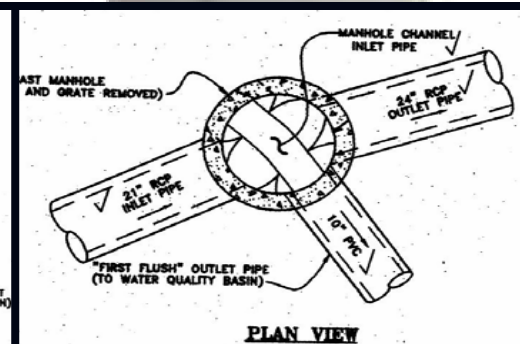
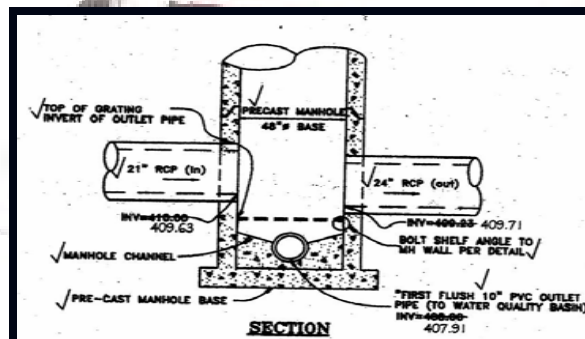
Underground Detention Pipe System

Other types of Stormwater Facilities

- Yes, there are other types of underground stormwater facilities.
- When you are asked to bid on any stormwater facility that is not covered in today's training call the MC.DEP Inspector for cleaning instructions.
- For Department of Permitting Services stormwater facility design specification:
<http://permittingservices.montgomerycountymd.gov/dpstmpl.asp?url=/permitting/docs/nfdoclist.asp>



Flow Splitter



Flow Splitter Maintenance

- Remove all trash and debris from interior of structure.
- Remove grate and remove any trash and debris below grate
- Reset and secure grate.



Other Types of Structures Installed in Montgomery County

Following are slides of other structures that have been installed in the County.

Should you be asked to maintain the following types of structures, please contact our inspection staff prior to performing maintenance so that maintenance procedures can be discussed and reviewed.

Aqua-Swirl™ STORMWATER TREATMENT SYSTEM

Inspection & Maintenance

- AquaShield™ offers an extensive maintenance program that ensures system performance efficiency
- Download manuals from the on-line system catalog

Bypass

- Systems are designed to treat water quality flow rates and bypass peak storm events
- Internal and external bypass configurations are available

Pipe Connections

- Systems are designed with custom inlet / outlet diameters at various configuration angles
- Inlet / outlet stubouts are provided for easy coupling

Vortex Separation

- Utilizes hydrodynamic and gravitational forces with quiescent settling to remove gross pollutants
- Extensive Computational Fluid Dynamic (CFD) modeling and full-scale physical testing by independent third parties

Storage Capacities

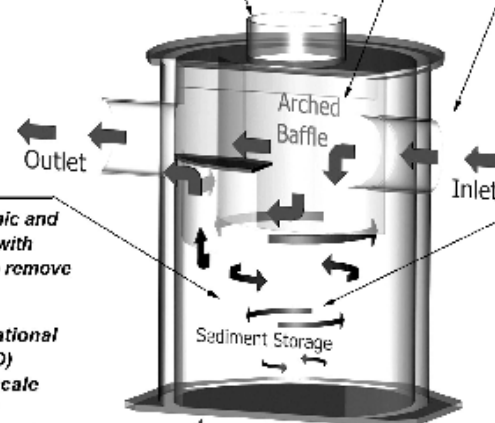
- Large storage capacities for oil, debris, and sediment extend maintenance cycles
- Sediment storage capacities range up to 270 ft³
- Oil and debris storage capacities range up to 1688 gallons

Installation Benefits

- Quick and simple installation, resulting in measurable project cost savings
- H2O loading capabilities
- Small footprint design reduces excavation costs
- Lightweight and durable construction
- Lifting supports & cables provided

Aqua-Swirl™ System

- Provides customized solutions for project specific requirements
- Systems designed for specific water quality treatment flows
- Modular sizes from 2.5 - 12 ft diameters with attached risers to finish grade
- On-line project and system design tool at <http://pda.aquashieldinc.com>



AquaShield™
STORMWATER TREATMENT SOLUTIONS

Aqua-Filter™

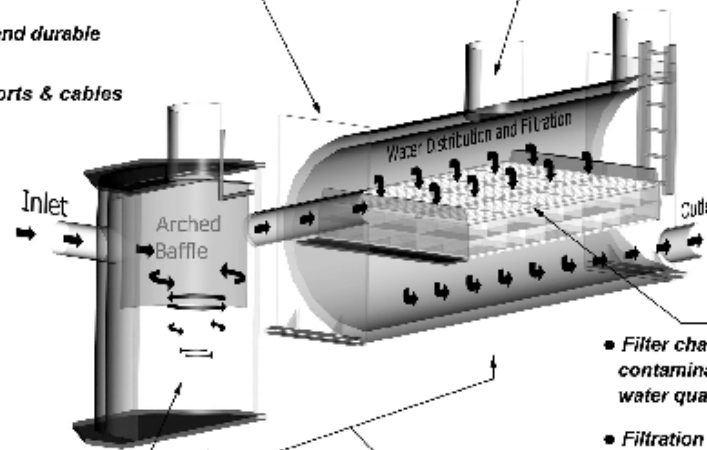
STORMWATER TREATMENT SYSTEM

Installation Benefits

- Installs easily without the use of a crane, resulting in measurable project cost savings
- H₂O loading capabilities
- Inlet / outlet stub-out connections
- Lightweight and durable construction
- Lifting supports & cables provided

Inspection & Maintenance

- AquaShield™ offers an extensive maintenance program that will keep the system at peak performance
- Download manuals from the on-line system catalog



Filter Media

- Filter chamber removes contaminants and improves water quality
- Filtration media captures stormwater pollutants through interstitial pores
- Wide range of filtration media available

Swirl Concentrator

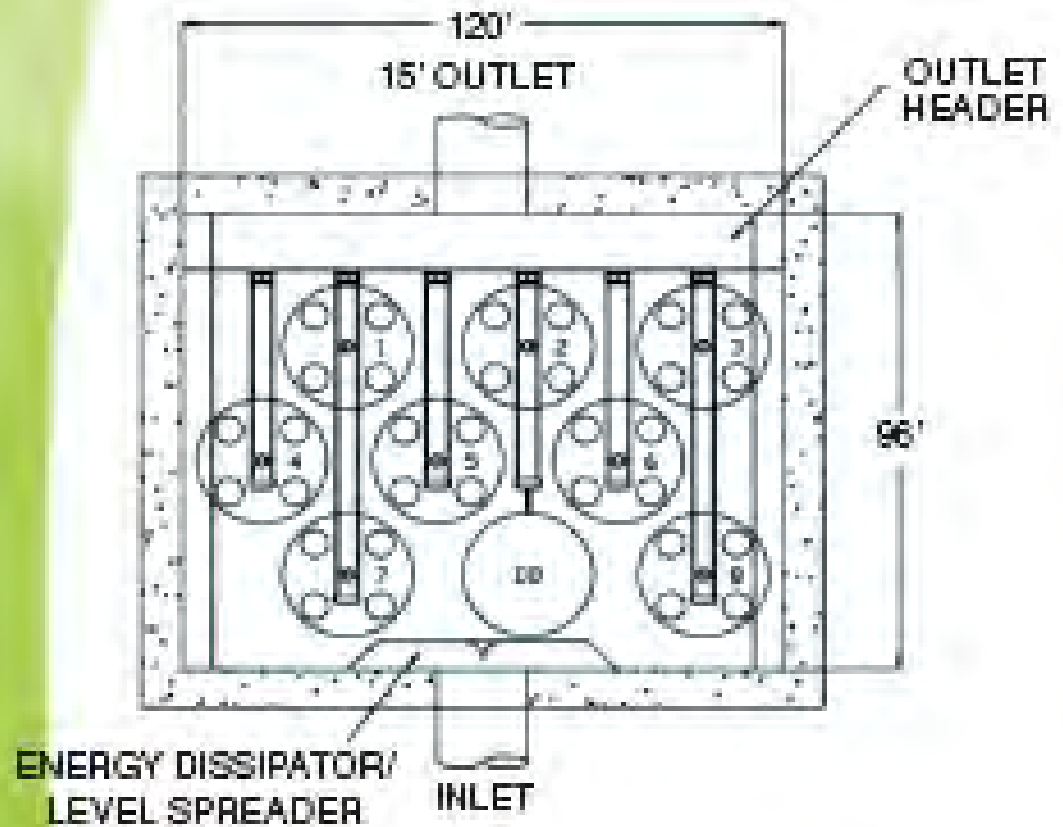
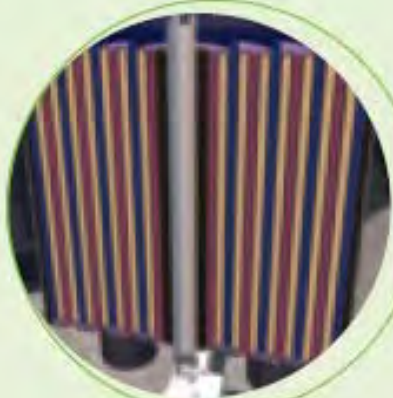
- Utilizes hydrodynamic and gravitational forces to remove gross pollutants prior to filtration
- Extensive Computational Fluid Dynamic (CFD) modeling and full-scale physical testing by independent third parties

Aqua-Filter™ System

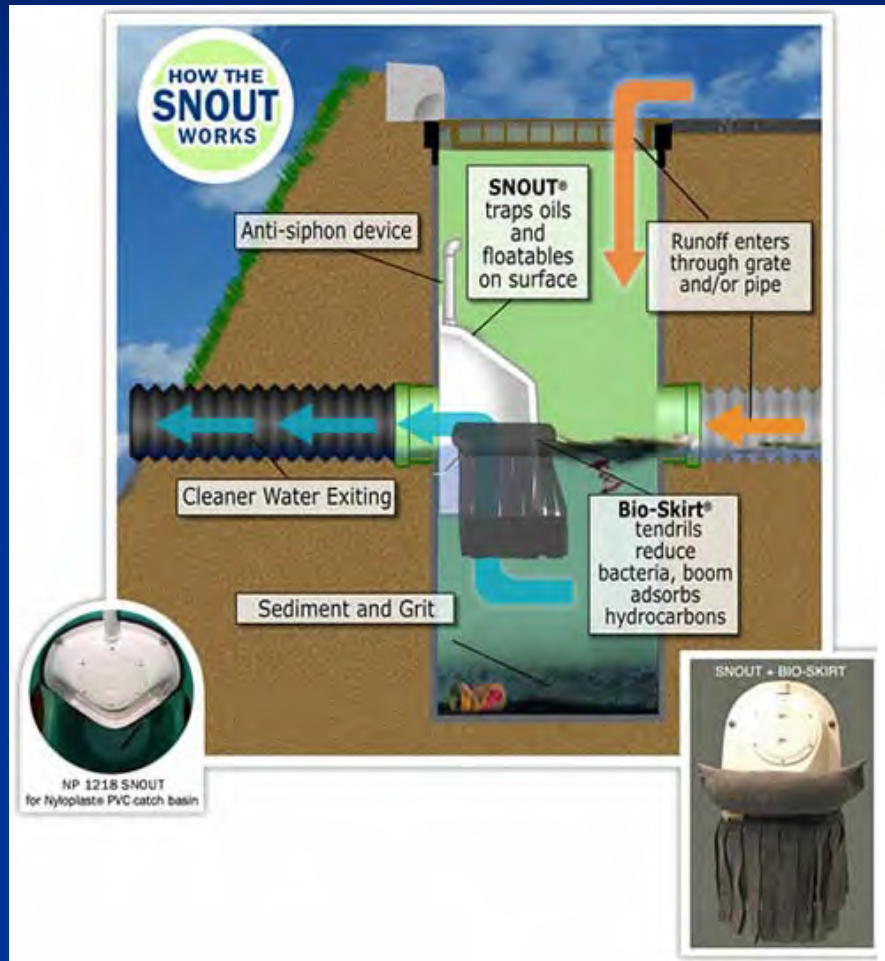
- Provides a treatment train solution tailored to site specific needs
- Systems designed to specific water quality filtration flows
- On-line project and system design tool at <http://pda.aquashieldinc.com>

AquaShield™
STORMWATER TREATMENT SOLUTIONS

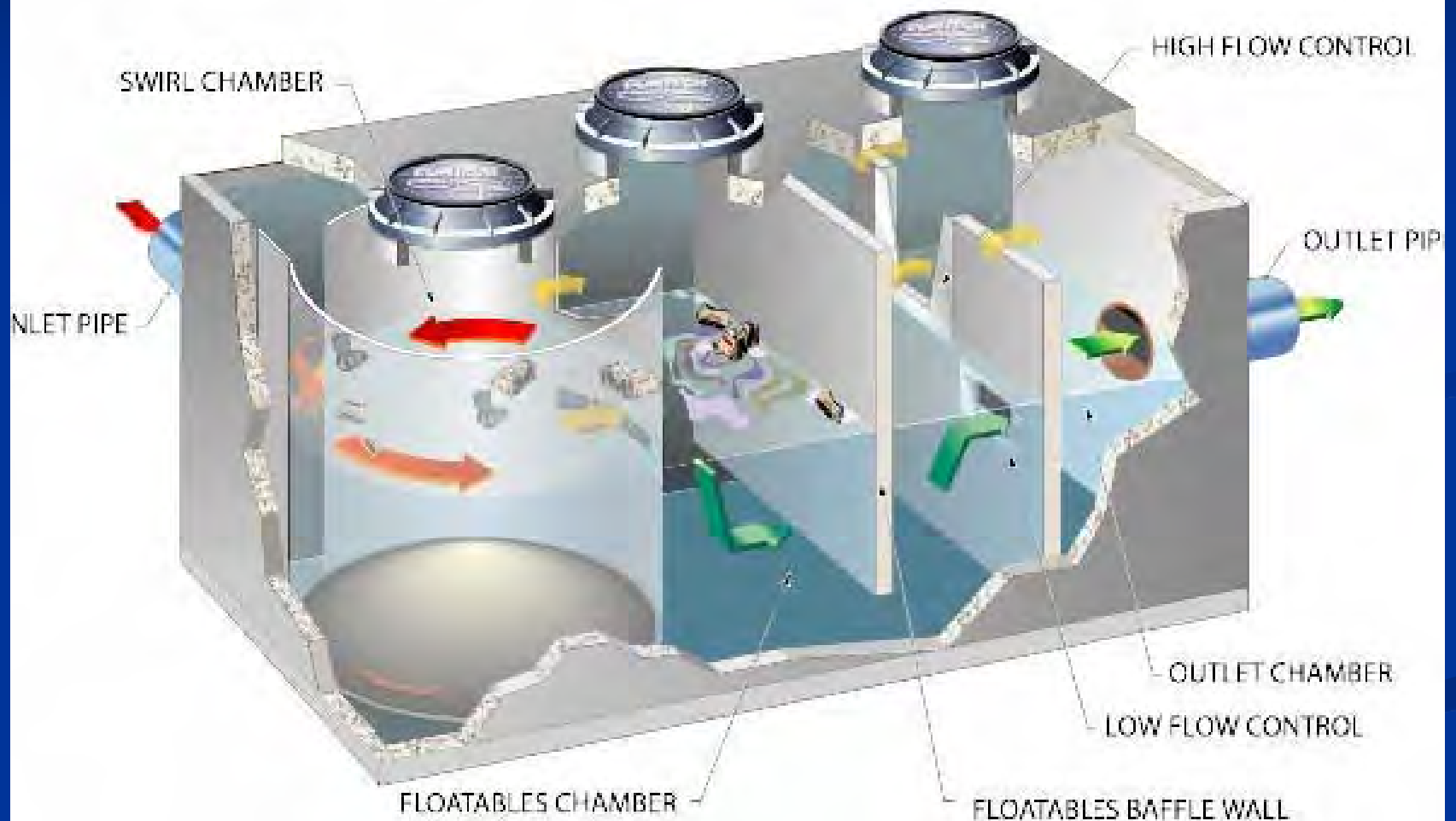
ADS BAYFILTER™ STORMWATER FILTRATION SYSTEM



The “Snout”



“Vortechnics”



Environmental 21 V2B1



Typical Repairs

Exposed Steel Requires Parging



Before



After

Typical Repairs

Form Tie Holes Need to Be Grouted



Before



After

Typical Repairs

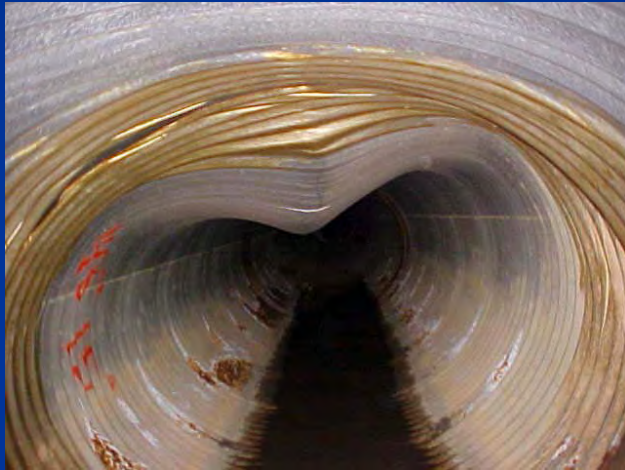


Securing
Loose
Manhole
Steps



Trash Rack
Replacements

Serious Problems Requiring Immediate Attention



**Crushed Pipes,
Pipe Deflections
(Pipes out of Round)**



**Pipe Joint Leaks
and Separations**



**Excessive Soil
Accumulations
and Soil Infiltration
to Structures**

Serious Problems Requiring Immediate Attention



Pavement Cracking,
Pavement Failures Over
Underground Facilities



Questions

